



COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**

ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

DEVAL L. PATRICK  
Governor

TIMOTHY P. MURRAY  
Lieutenant Governor

IAN A. BOWLES  
Secretary

ARLEEN O'DONNELL  
Commissioner

June 27, 2007

Robert Moylan Jr., Commissioner  
City of Worcester  
Department of Public Works  
20 East Worcester Street  
Worcester, MA 01608

City of Worcester  
PWS ID # 2348000  
Water Management Permit Appeal Settlement  
Water Management Permit 9P-2-11-348.01 &  
9P3-2-12-348.03

Settlement of Administrative Appeals  
DEP Docket Nos. 90-261 & 91-177

Dear Mr. Moylan:

Please find the attached documents:

- Commissioner's Final Decision dated June 27, 2007;
- Signed copy of the Settlement Agreement;
- Findings of Fact in Support of the Permit Decisions; and
- Final Water Management Act Permits #9P-2-11-348.01(Nashua Basin) and 9P3-2-12-348.03 (Blackstone Basin) issued to the City of Worcester.

If you have any questions regarding the settlement decision or permits, please contact Duane LeVangie at (617) 292-5706.

Sincerely,

Glenn Haas  
Acting Bureau Director  
Bureau of Resource Protection

Enclosures

Cc: Duane LeVangie, WMA Manager, Boston Office  
Martin Suuberg, MassDEP Regional Director- CERO  
David M. Moore, City Solicitor, City of Worcester, Worcester City Hall, Room 301, Worcester, MA 01608  
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Y:\DWP Archive\Boston\Worcester- Permit 9P3-2-12-348.03 WMA-2007-6-27



## **Communication for Non-English Speaking Parties (310 CMR 1.03(5)(a))**

### **English**

This document is important and should be translated immediately.

### **Spanish**

*Este documento es importante y se debe traducir inmediatamente.*

### **Portuguese**

*Este original é importante e deve ser traduzido imediatamente.*

### **Italian**

*Questo documento è importante e dovrebbe essere tradotto immediatamente.*

### **Greek**

Αυτό το έγγραφο είναι σημαντικό και πρέπει να μεταφραστεί αμέσως.

### **French**

*Ce document est important et devrait être traduit immédiatement.*

### **Chinese (traditional)**

這個文件重要和應該立刻被翻譯。  
这个文件重要和应该立刻被翻译。



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**Findings of Fact in Support of the Permit Decisions**  
**Water Management Permit #9P-2-11-348.01 (Nashua Basin)**  
Issued in Conjunction with Permit #9P3-2-12-348.03 (Blackstone Basin)

The Massachusetts Department of Environmental Protection (the Department) and the City of Worcester, Department of Public Works (the City) agree to the following Water Management Act permit decisions in the Nashua River Basin and the Blackstone River Basin.

**Worcester's Water Withdrawal History**

The City is registered for an average annual daily withdrawal volume of 9.85 million gallons per day (mgd) from the Nashua Basin, and 14.22 mgd from the Blackstone Basin. The combined 24.07 mgd authorized by these registrations has been used to not only supply consumers in the City of Worcester but also neighboring communities. According to Worcester's 2005 Annual Statistical Report (ASR), the City sold water to Auburn, Holden, Paxton, the Elm Hill Water District, West Boylston, Millbury and the Millbury Industrial Park. It also reported purchasing water from the Town of Holden in 2005 as well.

The City applied for Water Management Permits to increase their authorized withdrawal volumes from their sources in the Blackstone River Basin in 1989 (application #9P-2-12-348.01) and 1991 (#9P3-2-12-348.03). In both instances the permits were denied by the Department because of concerns that the requested withdrawal volume exceeded the safe yield of the City's reservoir system. The City appealed both decisions (Docket No. 90-261 for application #9P-2-12-348.01 and Docket No. 91-177 for application #9P3-2-12-348.03).

Subsequently in 1994, the City filed a permit application (#9P-2-11-348.01) to increase their authorized withdrawal volumes from their Nashua River Basin sources. The Department, recognizing that those issues regarding the calculation of reservoir safe yield unresolved in Worcester's Blackstone Basin appeals were relevant to City's Nashua River Basin sources as well, agreed to delay any final decision on the Nashua permit application until an acceptable methodology could be established for calculating reservoir safe yield. After extensive work by the Department to standardize a methodology for calculating reservoir safe yield and additional efforts by the City to evaluate and quantify their reservoir system's safe yield, the Department and the City agree that the safe yield is sufficient to meet current and future demands.

To settle the original appeals of the Blackstone Basin application denials and to issue a final decision on the Nashua River Basin permit application, the Department hereby approves the attached Water Management Act permit (permit) decisions in accordance with the Act. The Department makes the following Findings of Fact in support of the attached Nashua Basin permit, and includes herewith its reasons for approving the permits and for conditions of approval imposed, as required by MGL c 21G, s 11 and 310 CMR 36.00.

### **The Water Management Act**

The Act requires that the Department issue permits that balance a variety of factors including:

- Reasonable protection of existing water uses, land values, investments and enterprises;
- Reasonable conservation consistent with efficient water use;
- Reasonable protection of public drinking water supplies, water quality, wastewater treatment capacity, waste assimilation capacity, groundwater recharge areas, navigation, hydropower resources, water-based recreation, wetland habitat, fish and wildlife, agriculture, flood plains; and
- Reasonable economic development and job creation.

The Department has determined that there is documented evidence that water withdrawals and an increase in development and impervious area, combined with the transfer of wastewater, substantially contribute to low flow in the Commonwealth. These low flows impact the ability of rivers and tributaries to adequately serve all of the competing uses described in the Act.

To better achieve the balance of competing water uses mandated by the Act, the Department has adopted the “Water Management Policy For Permit and Permit Amendment Applications and 5-Year Review, Effective Date: April 2, 2004” and the “Guidance Document for Water Management Act Permitting Policy, Effective Date: January 17, 2006”. The policy, WMA Policy #: BRP/DWM/DW/P04-1, and guidance, Guidance #BRP/DWM/DW/G05-01, can be found on the Department’s web site at <http://www.mass.gov/dep/water/laws/policies.htm#wmgt> under “Water Management Policies”. The policy and guidance identify specific performance standards and conditions to be applied to new Water Management permits and to existing permits at the time they are amended, during 5-year permit review or permit renewal.

While the Department tried to incorporate many aspects of our recent policy and guidance in this permit, we did vary some requirements to reflect the lengthy settlement discussions involved with these appeals. Both permits now incorporate the performance standards for low-stress river basins. The Department has notified the City that the more stringent Performance Standards required in the medium stressed Nashua River Basin will be included at the time of the next 5-Year Review in 2009.

### **Finding of Fact for the Performance Standards in Worcester’s Water Management Permit**

In determining the performance standards in Water Management permits, the Department relies primarily upon the stressed basin determinations contained in the Water Resources Commission’s (WRC) Stressed Basins Report approved December 13, 2001, and upon future revisions to these stressed basin determinations by the WRC. The Department also conducts reviews of other available

research and reports by the United States Geological Survey, the Department's Watershed Water Quality Assessment Reports and any other pertinent reports available for specific river basins.

Worcester's sources are located in both the Nashua River Basin, which is identified as a medium stress basin by the WRC's Stressed Basins Report; and the Blackstone Basin, which is designated as a low stress basin. The map of stressed basins can be reviewed at the following link:

<http://www.mass.gov/dep/water/laws/policies.htm#wmgt> under "Water Management Policies", Flow Stress Map. As noted above, the Department has applied the Performance Standards required in the low stress Blackstone Basin in both the City's permits at this time, while putting Worcester on notice that the more stringent Performance Standards required in the medium stressed Nashua Basin will be applied in 2009 when all the Nashua Basin permit will be reviewed.

The policy and guidance established the following performance standards for all permittees that withdraw water from low stressed river basins:

1. Residential gallons per capita day water use (RGPCD) of 80 gallons or less;
2. Unaccounted for water (UAW) of 15% or less;

While these performance standards represent the minimum standards required for compliance with the permits, the Department believes that they are reasonable standards for effective water conservation and that through the implementation of all the terms and conditions of Water Management permits, permittees can exceed the performance standards for RGPCD and UAW.

### **Finding of Fact for Special Permit Conditions**

In issuing permits, the Department looks primarily at site-specific impacts and other issues specific to the system, such as impacts to nearby streams, wetlands, or other water users, justification of long-term demand projections and the capacity of permitted withdrawal points. The conditions are intended to ensure the efficient use of water and to mitigate the potential impact of withdrawals.

**Special Conditions 1, Maximum Authorized Annual Average Withdrawal Volume**, reflects the registered withdrawal volume of 9.85 mgd for the Nashua Basin, and 14.22 mgd for the Blackstone Basin. For the period from 1/31/07 to 2/28/09, the permitted volume of 3.79 mgd is authorized for the Nashua Basin (total Nashua volume is 13.64 mgd) and another 3.79 mgd for the Blackstone Basin (total Blackstone volume is 18.01 mgd), while the City's total withdrawals may not exceed the combined registered withdrawal volume of 24.07 mgd<sup>1</sup>, until such time as the City demonstrates to the Department's satisfaction that all permit conditions have been met and additional withdrawals are necessary to meet documented demand. Upon that demonstration, total combined withdrawals through February 28, 2009 shall not exceed 27.86 mgd, the expiration date of the City's Blackstone permit. The additional authorized withdrawal volumes are based on water use projections prepared by the Department of Conservation and Recreation, Office of Water Resources (formerly DEM).

**Special Condition 2, Maximum Authorized Daily Withdrawal**, reflects the maximum daily withdrawal rate by treatment facility design capacity. The Worcester Water Treatment Facility, located

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<sup>1</sup> These volumes are contingent upon Worcester renewing their registrations by January 1, 2008.

on Reservoir Road is designed for 50 mgd. Daily withdrawals from the reservoir system are not to exceed 50 mgd.

### **Special Condition 3, Firm Yield of Surface Water Supplies**

The Department recognizes the Worcester Department of Public Works conducted a firm yield study through its consultant, Camp, Dresser and McKee (CDM) with the 1985 RESSIM model. With the assumptions therein, the RESSIM firm yield finding, combined for both the Nashua and Blackstone Basins, was **29.5 mgd**. Any operational or physical changes to the reservoir system that will affect firm yield will require additional modeling with the Department's approval in the scope of work for the re-modeling.

In addition, the City shall evaluate and report on the impact of maintaining reservoir releases downstream of Pine Hill and Quinapoxet Reservoirs (**see Appendix A**) on the firm yield of the Worcester system, the impact of said releases on the City's ability to meet current and future demands, and report on the associated costs, including any physical modifications to existing control structures that may be necessary to maintain said releases. The City may evaluate releases with modeling through CDM's RESSIM, the MassDEP Firm Yield Estimator, another reservoir model approved by the Department, participation with the earmarked U.S. Geological Survey (USGS) study on firm yield (Firm Yield III) funded by the Department, or through other means acceptable by the Department. This data is required in order for the Department to evaluate the benefit of said releases to mitigate Worcester's withdrawal impacts on flow. The Department would suggest meeting with us to discuss the report prior to its development.

**Special Condition 4, Water Supply Source Protection.** Although Worcester has a Surface Water Protection Plan approved by the Department, the City is also required to meet 310 CMR 22.20C (2) (a), (b) and (c) by developing land use controls within the Zone A for the surface water reservoirs lands within the City limits by **June 30, 2008**.

The Zone A for the City's surface water reservoirs extends into neighboring communities. Worcester must demonstrate a "best effort" to meet the requirements 310 CMR 22.20C(1)(f) or (g) by either encouraging communities that incorporate portions of the City's Zone A to develop local land use controls that meet the requirements of 310 CMR 22.20C(2) to protect the portion of Zone A that lies within their municipal boundaries, or demonstrating that the City controls the Zone A by **June 30, 2008**.

### **Special Condition 5, Commercial, Industrial, and Institutional Conservation Program**

The City shall develop and implement an outreach program to inform its largest users of ways to reduce water use. This program shall include such items as information on water audits, meter sizing, water reuse, low-flow plumbing fixtures, mandatory outdoor water use restrictions, and the like. The City shall be prepared to report on the results of this program to MassDEP and implement further actions as determined and directed by the Department. Further guidance is offered in the permit.

### **Special Condition 6, Reporting Requirements**

This requirement ensures that the information necessary to evaluate compliance with the conditions included herein is accurately reported. The City shall report on the Annual Statistical Report both the

raw water volumes and finished water volumes for the entire water system. In addition, the City shall report specific volumes for Quinapoxet Reservoir and other locations as noted.

### **Special Condition 7, General Conservation Requirements**

The City is required to meet minimum performance standards approved by the Massachusetts Water Resources Commission.

While the Department recognizes that 100% of the City's service connections are metered, meters must be properly sized and accurate according to American Water Works Association. The City is also required to have and implement a plan for repairing, replacing and recalibrating individual service meters and calibrate source meters on an annual basis.

At a minimum, the City shall conduct a full leak detection survey every two years until unaccounted for water meets the Performance Standard. In addition, when the percentage of unaccounted for water increases by 5% or more, the City shall perform and complete a leak detection survey of its entire distribution system within one year. A report on any and all leak detection surveys shall be submitted to the Department. The City shall also maintain leak repair reports available for inspection by the Department.

The City shall take steps to ensure that water supply system operations are fully funded by water supply system revenues. The pricing system should reflect the full cost of items noted in the permit.

The City shall enforce the March 1, 1989 plumbing code for new construction and building rehabilitation requiring installation of water saving devices and low flow toilets. If the annual residential consumption is **eighty (80) gallons or more per capita per day**, the City shall develop and implement a program to provide and make available retrofit devices to consumers. In addition, a plan and schedule for the retrofitting of municipally owned buildings is required as well.

By **December 31, 2007**, the City must submit a plan for a public education program and implementation schedule to the Department as specified in the permit.

### **Special Condition 8, Performance Standards**

Beginning calendar year **2007**, the City shall meet the following Performance Standards: 1) Unaccounted for water shall not exceed 15% of overall water use; and 2) Residential Per Capita Water Use shall not exceed 80 gallons per day.

In addition the City shall begin preparing a plan to meet the more stringent Performance Standards that will be required of all permittees in the Nashua River Basin with the 5 Year Review of those permits in 2009. Under these Performance Standards, permit holders in Medium Stressed Basins will need to meet an unaccounted for water percentage that shall not exceed **10%** of overall water use, and residential per capita daily water use not to exceed 65 gallons per day, within 2 full calendar years of permit modification.

As reported in the **2005** Annual Statistical Report, **Worcester's** unaccounted-for-water was **18 %**; and the Residential Per Capita Water Use (RGPCD) was **61 gallons**.

**Special Condition 9, Enhanced Water Conservation Plan**

If, in any year, the City fails to comply with the Performance Standard for RGPCD, the City must develop and implement an enhanced water conservation plan for the following year as noted in the permit.

The summary of permit conditions above as part of the Department's findings of fact is not intended to, and should not be construed as, modifying any of the permit conditions. In the event of any ambiguity between the summary and the actual permit conditions, the permit language shall be controlling.





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This permit is approved pursuant to the Massachusetts Water Management Act for the sole purpose of authorizing the withdrawal of a volume of water as stated below and subject to the following special and general conditions. This permit conveys no right in or to any property beyond the right to withdraw the volume of water for which it is issued.

**PERMIT NUMBER:** 9P-2-11-348.01                      **RIVER BASIN:** Nashua  
**PERMITTEE:** City of Worcester  
Department of Public Works  
20 East Worcester Street  
Worcester, MA 01608

**EFFECTIVE DATE:** June 27, 2007  
**EXPIRATION DATE:** February 28, 2014  
**TYPE AND NUMBER OF WITHDRAWAL POINTS:**  
Groundwater: 0  
Surface Water: 3

**USE:** Public Water Supply  
**DAYS OF OPERATION:** 365  
**WITHDRAWAL POINT(S) IDENTIFICATION:**

Name	Point ID Code
Pine Hill Reservoir	2348000-04S
Quinapoxet Reservoir	2348000-05S
Kendall Reservoir	2348000-03S

**Table 1. Withdrawal Point Identification**

**NOTE:** The Worcester Department of Public Works operates three (3) surface water reservoirs in the Nashua Basin. The Pine Hill Reservoir flows by gravity to the Kendall Reservoir and in addition, the Quinapoxet Reservoir is pumped into the Kendall Reservoir. Kendall Reservoir then flows by gravity into Holden Reservoir # 1. Holden Reservoir #1 is located in the adjacent Blackstone River Basin. Surface waters from Holden Reservoir #1 flow into the Worcester Water Treatment Facility for treatment and circulation into the drinking water supply distribution system network.

## **SPECIAL CONDITIONS**

### **1. Maximum Authorized Annual Average Withdrawal Volume**

This permit authorizes the withdrawal of water, on average over a calendar year, at the rate described below. The Worcester Department of Public Works is presently registered for 9.85 mgd from the Nashua Basin and 14.22 mgd from the Blackstone Basin authorized through the Water Management Act. The permitted volumes authorized below are in addition to those registered volumes and represent the maximum volume that may be withdrawn from Worcester's Nashua River Basin sources.

The Department of Environmental Protection ("the Department" or "DEP") bases the authorized withdrawal volumes on the raw water withdrawn from the withdrawal sources less the volumes discharged back into Holden Reservoir #2 and will use the raw water withdrawal volumes to assess compliance with the registered and permitted withdrawal volumes.

The permitted volume is expressed in millions of gallons, both as an average daily withdrawal rate per year (million gallons per day-mgd), and as a total annual withdrawal volume (million gallons per year- mgy) for each five-year period of the permit term.

Withdrawals authorized by this permit and by your registration are as follows:

**Table 2: Maximum Authorized Withdrawal Volumes**

5-Year Periods		Total Raw Water Withdrawal Volumes			
		Permit		Permit + Registration	
		Daily Average (MGD)	Total Annual (MGY)	Daily Average (MGD)	Total Annual (MGY)
Period One Years 2-5		Not Applicable			
Period Two Years 6-10		Not Applicable			
Period Three Years 11-15	6/27/2007 to 2/28/2009	3.79	1383.35	13.64	4978.6*
Period Four Years 16-20	3/1/2009 2/28/2014	5.43	1981.95	15.28	5577.2*

\*The Department also restricts the withdrawal volumes from Worcester's Nashua Basin and Blackstone Basin sources to a combined total not to exceed 27.86 mgd through February 28, 2009, at which point Worcester's Blackstone Basin permit will expire and be subject to renewal.

These volumes are contingent upon Worcester renewing their registrations by January 1, 2008.

In addition, the City's authorized withdrawal from their Blackstone and Nashua Basin sources is further limited to the combined registered withdrawal volume of 24.07 mgd until such time as they demonstrate to the Department's satisfaction an actual demand in excess of the combined registered volume. That demonstration must include a detailed discussion of both current demand, including the volumes being sold or transferred by the City to other public water suppliers, but also a detailed discussion of the projected increases both within the City limits but also any proposed increase in the volumes proposed to be sold by the City.

## **2. Maximum Authorized Daily Withdrawal Volume**

Withdrawals from the reservoir systems are not to exceed the approved design capacity of the Worcester Water Treatment Facility, located on Reservoir Road, without the specific advance written approval of the Department.

<b><u>Source</u></b>	<b><u>Source Code</u></b>	<b><u>Approved Maximum Daily Withdrawal</u></b>
Worcester Water Treatment Facility	2348000-03T	50.00 mgd

## **3. Firm Yield of Surface Water Supplies**

The Department recognizes that the Worcester Department of Public Works has utilized a computerized model for calculating firm yield (1985 RESSIM model) for the City's reservoir system, through their consultant engineer, Camp, Dresser and McKee (CDM).

Based on a review of the 1985 RESSIM model and the assumptions therein and subsequent model results and adjustments, a firm yield of twenty nine million, five hundred thousand gallons (29.5 mgd) is available for use on a daily basis, as an annual average, from the combined reservoir systems in the Nashua and Blackstone River Basins.

The Worcester Department of Public Works will rerun the computerized model if there are changes to the existing reservoir operational scheme or physical changes to the reservoir(s) that could affect the firm yield that is available from the existing reservoir systems. If further work is required to rerun the RESSIM model, the City will contact the Department to finalize a scope of work for a re-evaluation.

In addition, the City shall evaluate and report on the impact of maintaining reservoir releases downstream (see Appendix A for proposed release scenarios) of the Pine Hill and Quinapoxet Reservoirs on the Firm Yield of the Worcester System, the impact of said releases on your ability to meet your current and future demands, and report on the associated costs, including any physical modifications to existing control structures that may be necessary to maintain said releases. Your evaluation may be conducted through modeling with RESSIM, the MassDEP Firm Yield Estimator, another reservoir yield model approved by the Department, participation with the ongoing U.S. Geological Survey (USGS) study on firm yield (Firm Yield III) funded by the Department, or through other means acceptable to the Department.

The proposed report shall be submitted to DEP's Boston and Central Regional Offices by December 31, 2008, or should you decide to participate in the USGS study, the report shall be submitted 6 months after USGS publishes the results (anticipated publication no sooner than December, 2008)

Upon a review of the report's results the Department will evaluate the benefits of requiring said releases as means to mitigate increasing withdrawals and/or avoid other permitting requirements. The Department will consider requiring the implementation of said releases as a condition to be included at the next 5 Year Review of this permit or future permit renewals.

#### **4. Surface Water Protection**

The Worcester Department of Public Works has developed a Department approved Surface Water Protection Plan. The Worcester Department of Public Works shall work to meet Department Regulations 310 CMR 22.20C (2) A, B and C by developing land use controls within the Zone A for the surface water reservoir lands within the City limits by **June 30, 2008**.

The City must also demonstrate a “best effort” to meet 310 CMR 22.20C(1)(f) or (g) to encourage those communities in which the Zone A of their surface water supplies extends to develop local land use controls that meet the requirements of 310 CMR 22.20C(2) to protect the portion of Zone A that lies within their municipal boundaries or to demonstrate water system control of the Zone A by **June 30, 2008**.

For additional information or for assistance with developing land use controls, contact the Surface Water Protection Section of DEP’s Drinking Water Program in Boston.

#### **5. Commercial, Industrial , and Institutional Conservation Program**

The City shall review the use records for its industrial, commercial and institutional water users and develop an inventory of the largest water users. The City shall develop and implement an outreach program designed to inform and work with (where appropriate) its largest users of ways to reduce water use. Such outreach plans can include, but are not limited to, information on water audits, meter sizing, water reuse, low-flow plumbing fixtures, mandatory outdoor water use restrictions, suggestions for contacting trade associations for process specific information on water use reduction, and information on contacting the Executive Office of Environmental Affairs Office of Technical Assistance (OTA) for Toxics Use Reduction which offers a range of assistance and information to help facilities improve water use efficiency and reduce waterwater discharge. OTA can be contacted at (617) 626-1060 or at [www.mass.gov/envir/ota](http://www.mass.gov/envir/ota).

Upon request by the Department, the City shall report on the results of the above outreach program including: (1) the results of the inventory of the City’s largest users; (2) copies of any outreach materials distributed to those users; (3) and to the extent available, a summary of water use reductions or savings that have resulted. Upon receipt of this report, the Department may determine that additional actions to promote water conservation by the City’s largest users are necessary. Should the Department determine that such additional actions are warranted it will so notify the City. The City will thereafter develop, for the Department’s review and approval, a schedule for implementation of any such additional actions.

#### **6. Reporting Requirements**

The City shall report on the Annual Statistical Report both the raw water volumes and finished water volumes for the entire water system. Raw water volumes for Nashua Basin withdrawals shall be measured at the weir for the Kendall Reservoir transfer. Water pumped from Quinapoxet Reservoir, though included in the Kendall Reservoir transfer measurement, shall be reported. Blackstone Basin withdrawals shall be measured by venturi meter at the intake to the Water Filtration Plant then subtracting Nashua Basin withdrawals from total metered withdrawals. As an

alternative to total metered withdrawals measured at the Water Filtration Plant, the City may use venturi metered flow of finished water into the distribution system plus metered flow used for filter backwash as a measure of total raw water withdrawal. Blackstone Basin withdrawals may also be adjusted by subtracting the metered return flow of settled backwash water to Holden Reservoir No.2.

## **7. General Conservation Requirements**

The City shall implement the actions listed below to meet the minimum performance standards developed by the Massachusetts Water Resources Commission.

### **Metering**

100% of the service connections shall continue to be metered. All meters must be of proper size and accuracy to measure water flow to within (3%+/-) as outlined by standards set forth by the American Water Works Association.

By December 31, 2007, provide for the Department's review any existing or proposed plan the City has for repairing, replacing, or recalibrating all individual service meters, over ten years of age, and for the testing of all meters three inches in size or greater.

The City shall continue to calibrate all source meters on an annual basis.

### **Leak Detection**

At a minimum, the City shall conduct a full leak detection survey every two years, until unaccounted for water meets the Performance Standard in effect at that time (see requirements in Special Condition #8).

Notwithstanding the above, the City shall perform and complete a leak detection survey of its entire distribution system within one year whenever the percentage of unaccounted for water inexplicably increases by 5% or more (for example an increase from 3% to 8%) over the percentage reported on its Annual Statistical Report for the prior calendar year. Within 60 days of completing any leak detection survey, the City shall submit to the Department for its review a report detailing the leak detection survey, any leaks uncovered as a result of the survey or otherwise, and the estimated water savings as a result of the repair.

### **Leak Repair**

The City shall maintain leak repair reports available for inspection by the Department.

It shall be the goal of the City to repair water distribution system leaks as soon as detected. In the event of the detection of multiple leaks, the City shall prioritize and attempt to make repairs in less than seven (7) days after detection. The City upon demand shall make repair reports available for inspection.

### Pricing

The City shall take steps to ensure that water supply system operations are fully funded by water supply system revenues. The pricing system should at least reflect the full cost of supplying water, including but not limited to:

- Administrative costs;
- Staff salaries, benefits, insurance and pension costs;
- Distribution system operation, maintenance and repair, including leak detection and repair costs and metering costs;
- Pumping costs and utilities;
- Treatment costs;
- Capital replacement costs, capital depreciation and debt service;
- Costs incurred by the public water system for water conservation programs and public education programs;
- Watershed or wellhead purchase and/or protection costs and land acquisition; and,
- Emergency planning.

Also see Special Condition # 9.

### Plumbing

The City shall enforce the March 1, 1989, plumbing code for new construction and building rehabilitation requiring installation of water saving devices and low flow toilets.

If the annual statistical report indicates that residential consumption is eighty (80) gallons or more per capita per day (RGPCD), the City shall develop and implement a program to provide and make available retrofit devices (faucet aerators, low flow shower heads and low flow toilets) to customers at cost during the next fiscal year. Determinations for RGPCD may be made separately for water users outside the City limits. The Worcester Department of Public Works will work towards establishing a similar policy of water conservation through plumbing with these water users, should the RGPCD exceed eighty (80) gallons.

A schedule for implementing a water use efficiency plan for retrofitting municipally owned buildings with water saving devices (faucet aerators, low flow shower heads and toilet displacement bottles/dams, etc.), should be prepared and submitted to the Department by December 31, 2007. Thereafter the plan shall be implemented in accordance with the Department approved schedule.

### Education

By December 31, 2007, submit for the Department's review a public education program and implementation schedule. Your program may include existing on-going educational efforts and shall at a minimum emphasize:

- all the costs of providing water;

- that investments in efficiency and conservation will provide consumers with long-term savings;
- how water use fluctuates throughout the year;
- the environmental benefits of conserving water.

## **8. Performance Standards**

Beginning calendar year 2007, the City shall meet the following Performance Standards.

- Unaccounted for water shall not exceed 15% of overall water use.
- Residential Per Capita Water Use shall not exceed 80 gallons per day.

In addition the City should begin preparing a plan to meet the more stringent Performance Standards that will be required of all permittees in the Nashua River Basin with the 5 Year Review of those permits in 2009. Under these Performance Standards, permit holders in Medium Stressed Basins will need to meet an unaccounted for water percentage that shall not exceed 10% of overall water use, and residential per capita daily water use not to exceed 65 gallons per day, within 2 full calendar years of permit modification.

### **Performance Standard for Unaccounted for Water**

Unaccounted for water shall not exceed 15% of overall water use.

The City's Annual Statistical Report shall provide a detailed assessment of its unaccounted for water. Unaccounted for water is defined by the Massachusetts Water Resources Commission as the difference between water pumped or purchased and water that is metered or confidently estimated. Unaccounted for water shall include water that cannot be accounted for due to meter problems, unauthorized hydrant openings, leakage, illegal connections, stand pipe overflows, and fire protection where it cannot be confidently estimated.

The need for water main flushing and the use of water in construction or meter calibration shall be metered or estimated as appropriate to assist in determining actual demand. Volumes flushed to waste shall be reported on the City's Water Supply Annual Statistical Report.

The Department recognizes that the City conducted a water audit in 2006. If the City exceeds 15% unaccounted-for water as reported on their 2007 Annual Statistical Report (submitted in 2008) then it shall, within 6 months of filing its Annual Statistical Report, submit to the Department a schedule for implementing the recommendations of the 2006 audit. Implementation of the recommendations shall begin in 2008 in accordance with the approved schedule.

### **Performance Standard for Residential Per Capita Water Use**

Residential Per Capita Water Use shall not exceed 80 gallons per day.

The City shall report its residential gallons per capita per day (rgpcd) and the calculation used to derive that figure as part of its Annual Statistical Report. The rgpcd is the total volume of

residential water use in gallons divided by the population served, then divided by 365 days. The source of the data used to establish the service population and the year in which this data was developed shall be provided. If the City fails to meet the Performance Standard for keeping residential per capita water use at or below 80 gallons per day, the City shall develop and implement an enhanced water conservation plan for the following calendar year. The plan shall be submitted with the Annual Statistical Report. At a minimum, the enhanced conservation plan, subject to the Department's approval, shall include the implementation of a program to make water saving devices such as faucet aerators, low flow shower heads and toilet displacement bottles/dams available to its customers at cost and to provide rebates or other incentives for the purchase of low flow appliances (washing machines, dish washers and toilets) and the installation of moisture sensors or similar control technology on irrigation systems.

## **9. Enhanced Water Conservation Plan**

If, in any year the City fails to comply with the Performance Standards for rgpcd, they must develop and implement an enhanced water conservation plan for the following calendar year. For any year in which the City is required to develop and implement an enhanced water conservation plan, they shall also submit with their Annual Statistical Report, a report documenting all actions taken by the City to develop and implement the enhanced water conservation plan.

The enhanced water conservation plan for the City may include without limitation the items listed below:

- Adoption and enforcement of a bylaw or other regulation to require moisture sensors or similar control technology on automatic sprinklers;
- More stringent restrictions on outside water use;
- Adoption and enforcement of a bylaw or other regulation to limit the amount of land clearing for the creation of lawns;
- Irrigation of recreational fields and parks in accordance with the Water Resource Commission's May 2002 Guide to Lawn and Landscape Water Conservation;
- Encouragement of the use of cisterns or rain barrels for outside watering thru the use of a rebate or at cost program;
- Enhanced public education outreach; and/or;
- An evaluation of the effectiveness of increasing block rates or seasonal rates to encourage conservation;
- Purchase and/or development of out-of-basin sources.
- Implementation of a water bank to provide for keeping at least an equivalent gallon of water within the basin for every gallon of water demand added to the system.

At a minimum, the enhanced water conservation plan shall meet the requirements set forth below:

- If the City fails to comply with the Performance Standard for keeping residential per capita water use at or below 80 gallons per day, the enhanced water conservation plan shall include the implementation of a program to make water saving devices such as faucet aerators, low flow shower heads and toilet displacement bottles/dams available to its customers at cost and to provide rebates or other incentives for the purchase of low flow appliances (washing machines, dish washers and toilets), and the installation of moisture sensors or similar control technology on irrigation systems.



- Any enhanced water conservation plan required by this Permit shall include (1) submission of a report that evaluates the effectiveness of a seasonal rate as a tool for encouraging water conservation, (2) implementation of any changes to the current rate structure that will enable the City to encourage water conservation, and (3) notification to the Department of the changes along with the reason for these changes.

**GENERAL CONDITIONS** (applicable to all permittees)

No withdrawal in excess of 100,000 gallons per day over the registered volume (if any) shall be made following the expiration of this permit, unless before that date the Department has received a renewal permit application pursuant to 310 CMR 36.00.

1. **Duty to Comply** The permittee shall comply at all times with the terms and conditions of this permit, the Act and all applicable State and Federal statutes and regulations.
2. **Operation and Maintenance** The permittee shall at all times properly operate and maintain all facilities and equipment installed or used to withdraw up to the authorized volume so as not to impair the purposes and interests of the Act.
3. **Entry and Inspections** The permittee or the permittee's agent shall allow personnel or authorized agents or employees of the Department to enter and examine any property for the purpose of determining compliance with this permit, the Act or the regulations published pursuant thereto, upon presentation of proper identification and an oral statement of purpose.
4. **Water Emergency** Withdrawal volumes authorized by this permit are subject to restriction in any water emergency declared by the Department pursuant to MGL c 21G ss 15-17, MGL c 150 ss 111, or any other enabling authority.
5. **Transfer of Permits** This permit shall not be transferred in whole or in part unless and until the Department approves such transfer in writing, pursuant to a transfer application on forms provided by the Department requesting such approval and received by the Department at least thirty (30) days before the effective date of the proposed transfer. No transfer application shall be deemed filed unless it is accompanied by the applicable transfer fee established by 310 CMR 36.37.
6. **Duty to Report** The permittee shall submit annually, on a form provided by the Department, a certified statement of the withdrawal, such report to be received by the Department by the date specified by the Department. Such report must be mailed or hand delivered to:  
Commonwealth of Massachusetts  
Department of Environmental Protection  
Water Management Program  
One Winter Street  
Boston, MA 02108

7. **Duty to Maintain Records** The permittee shall be responsible for maintaining withdrawal records as specified by this permit.
8. **Metering** All withdrawal points shall be metered or otherwise measured as described in Special Condition 6-Reporting Requirements. The meters shall be calibrated annually. The meter shall be maintained and replaced as necessary to ensure the accuracy of the withdrawal records.

**APPEAL RIGHTS AND TIME LIMITS**

This permit is a decision of the Department. This decision is agreed to by the Department and by the City in settlement of the following administrative appeals: DEP Docket Nos. 90-261 and 91-177. The City therefore waives any further right of appeal of this permit.

Nothing herein shall limit the City's right to request an adjudicatory hearing on, or otherwise contest or challenge, any decision of the Department made in the implementation of the provisions of this permit.

## Appendix A

RE: WMA and Worcester Public Water Supply Meeting 12/20/05  
Consideration of streamflow measures for reservoir release:

- \*\* Based on USGS STREAMSTATS estimates for natural flow streamflow statistics  
<http://ststdmamrl.er.usgs.gov/streamstats/expert.htm>
- \* Based on USGS streamflow requirements for habitat protection/index gage report  
(WRIR 03-4332)

### **Quinapoxet Reservoir**

Drainage area: 19.6 square miles

Possible release volumes at Quinapoxet Reservoir outlet:

- \* RVA 50<sup>th</sup> percentile August mean: 9.6 cfs (6.2 mgd)
- \* Q50 August median flow duration: 5.5 cfs (3.6 mgd)
- \* RVA 25<sup>th</sup> percentile August mean: 5.1 cfs (3.3 mgd)
- \*\* August Median: 3.49 cfs (2.26 mgd)
- \*\* 7Q2: 1.58 cfs (1.02 mgd)
- \*\* 7Q10: 0.66 cfs (0.43 mgd)

### **Pine Hill Reservoir**

Drainage area: 6.75 square miles

Possible release volumes at Pine Hill Reservoir outlet:

- \* RVA 50<sup>th</sup> percentile August mean: 3.3 cfs (2.1 mgd)
- \* Q50 August median flow duration: 1.89 cfs (1.2 mgd)
- \* RVA 25<sup>th</sup> percentile August mean: 1.8 cfs (1.2 mgd)
- \*\* August Median: 0.76 cfs (0.49 mgd)
- \*\* 7Q2: 0.31 cfs (0.20 mgd)
- \*\* 7Q10: 0.10 cfs (0.06 mgd)

### **USGS Quinapoxet Streamgage** at Canada Mills near Holden

Drainage area: 46.3 square miles

- \*\* August Median: 10.04 cfs
- \*\* 7Q2: 4.82 cfs
- \*\* 7Q10: 2.18 cfs